Towards a New Macroeconomics.
From ISLM-AS and DSGE to GSMS and GSMS-SS

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Different from conventional macroeconomic models, which start from the presumption that the economy is permanently in need of control and repair, the goods side/money side (GSMS) approach is not a tool to guide policy intervention but aims at demonstrating how the economy works. As such, the model provides an explanatory framework that should be particularly useful for business and finance, while the message for policy makers is mainly what not to do. The GSMS approach avoids the ambiguities about flexibility or rigidity of the price level, real and nominal variables and the short and the long run that plague ISLM-AS analyses. With business activity as the micro-foundation of the GSMS model, the approach does away with the surreal assumptions of DSGE models. In its GSMS-SS version, the model connects the short run with the long run laying the groundwork for a novel way of business cycle analysis. The GSMS and GSMS-SE models facilitate the teaching of macroeconomics and provide the tools for the systematic analysis of macroeconomic configurations and policy concepts.

Key Words: GSMS, ISLM, ISLM-AS, DSGE, AS/AD, Goods Side/Money Side, business cycle, Austrian economics, macroeconomic analysis, macroeconomic policy, inflation targeting, NGDP targeting,

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Different from conventional macroeconomic models, which start from the presumption that the economy is permanently in need of control and repair, the goods side/money side (GSMS) approach is not a tool to guide policy intervention but aims at demonstrating how the economy works. As such, the model provides an explanatory framework that should be particularly useful for business and finance, while the message for policy makers is mainly what not to do. The GSMS approach avoids the ambiguities about flexibility or rigidity of the price level, real and nominal variables and the short and the long run that plague ISLM-AS analyses. With business activity as the micro-foundation of the GSMS model, the approach does away with the surreal assumptions of DSGE models. In its GSMS-SS version, the model connects the short run with the long run laying the groundwork for a novel way of business cycle analysis. The GSMS and GSMS-SE models facilitate the teaching of macroeconomics and provide the tools for the systematic analysis of macroeconomic configurations and policy concepts.

1 Introduction

The main purpose of the construction of the ISLM and AS/AD models was to deliver analytical tools for economic policy in order to achieve ”full employment”, which later was modified to the “natural employment rate” as way to conciliate employment with a stable price level. The goal of this modeling was less to explain how the economy works, but to propose instruments for policymaking (Mankiw 2006). With this in mind, internal inconsistencies of the models, which would be injurious from the scientific point of view, apparently did not matter much in order to sell the device to policy makers. These, indeed, did little care about consistency as long as they had some device at hand to guide and justify their actions. For much of the same reasons, the ISLM-AS model has become the standard as analytical workhorse for the teaching of macroeconomics. In terms of its scientific merit, it has been mainly because of the lack of alternatives that this

approach still enjoys its standing in the classrooms as well as in the halls of power. The ISLM-AS models rules by default.

In their effort to escape the confines of ISLM-AS analysis, the New Keynesian and real business cycle approach - by way of its formulation as "dynamic stochastic general equilibrium" (DSGE) model - have gone the other way and sacrificed realism in favor of rigor while still struggling for relevance (Faust 2012). The economic crisis of 2008 renewed old doubts about the explanatory power of the established approaches to macroeconomics (Blanchard 2010). Prominent protagonist of the ISLM model (Hicks 1937) criticized its set-up and usage already much earlier because of the model's omissions and inconsistencies (Hicks 1980/81). In the original Keynesian-cross, for example, the move of the curve of effective demand happens *uno actu* with the responding shift of the equilibrium position to a new output as if there were no limits to production and thus as if scarcity were non-existent. There is an absence of business and consequently of capital (Garrison 2001) and entrepreneurship (Coase 2012) in the standard macroeconomic models. Colander (1995) points out that the aggregate supply and demand analysis is logically incompatible with the model of aggregate demand because the Keynesian model requires a fixed price level, while the construction of the AS/AD model explicitly employs price level changes. The ISLM and AS/AD models do not differentiate strictly between real and nominal values and between the short and the long (and of what lies in between). The New-Keynesian models exhibit paradoxical outcomes when the economy is at or near the zero-bound of the interest rate (Cochrane 2013). The need is widely felt of having an alternative model, which could substitute or at least complement and challenge the standard models.

2 Beyond ISLM and AS/AD

The ISLM model formally addresses the difference between the "real" and the "monetary" side of the economy in a deceiving manner. In this model, the IS-curve is to represent the "real" side of the economy, when, however, the magnitudes of aggregate demand are expenditures, i.e. monetary values. Demand determines income in the ISLM model, yet it is only by assuming a constant price level that one could also state that income is equal to production. The crucial assumption of the principle of effective demand links variations of demand directly to variations of production. There is no systematic differentiation between economic expansion (more output) and economic growth (capital accumulation and technological progress). The important difference

between an economic expansion based on more use of a given capacity and an economic growth, which comes from an increase of the quantity and quality of the factors of production, does not show up in these macroeconomic models.

In as much as the Keynesian macroeconomic models do not represent Keynes, modern neo-classical macroeconomics (Barro 1989) does not reflect classical macroeconomics. In neo-classical macroeconomics, macroeconomics evaporates as a subject. As a type of analysis, this approach boils down to an exercise in microeconomic techniques applied to public economic issues. Albeit being an offspring of monetarism, which put money back into macroeconomics, modern versions of rational expectations-new classical macroeconomics expelled money from macroeconomics altogether and have become intentionally oblivious to financial markets and to the monetary transmission mechanism. The so-called dynamic stochastic general equilibrium (DSGE) models have eliminated from its scope not only most of the "interesting" macroeconomic questions, but also many of the relevant issues (Buiter 2009). DSGE models ignore financial markets (other than as "frictions") and from early on its modelers have begun to remove money (Kregel 1985) until it has vanished almost completely (Laidler 2013).

The model introduced here under the label GSMS (goods side/money side) analysis avoids inconsistencies of the current standard models. The GSMS analysis distinguished systematically between the goods side (GS) and the money side (MS) of the economy. This model links economic growth to business activity and connects price movements to money as it reinstitutes scarcity and the non-neutrality of money. The GSMS model includes explicitly the financial sector as the transmission mechanism where economic interaction takes place between the money side and the goods side of the economy. Different from the ISLM-AS model, the main purpose of the GSMS and GSMS-SS model is not to provide policy tools but to show how the economy works. This way, the goods side/money side is as much relevant for business and financial market operators in understanding macroeconomics, as it is for policy makers what not to do than what to do.

3 The basic model

The quantity theory of money goes back to David Hume (1752) and before him to Nicolaus Copernicus (1526) and the 16th century Spanish scholastics (Huerta de Soto 2012). Irving Fisher (1907 and 1911) elaborated the equation of exchange in its modern version, while Milton Friedman (1956) reinstated this equation as a function of the

demand for money. The quantity theory of money formed the theoretical anchor for Keynes' (1924) "Tract on Monetary Reform". In the Fisher version, the equation of exchange relates money as a means of payment (*M*) multiplied by it velocity of circulation (*V*) to the number of buy and sell transactions (*T*) multiplied by the price level (*P*).

$$M_T \times V_T \equiv T \times P$$

The substitution of transactions (T) by production (Q) transforms the basic equation into

$$MV_Q = QP$$

In distinction to the Fisher transaction version, the Cambridge/cash balance/income version reads as

$$M = kY$$

The cash holding coefficient *k* is reciprocal to the velocity of circulation

$$k = \frac{1}{V}$$

The GSMS model makes the fundamental distinction between the "goods side" (GS) and the "money side" (MS) of the economy. Bringing monetary variables to the left side and isolating real production, the "monetary side" emerges as a distinction from the "goods side" (Hayek 1984, p. 100).

$$\frac{MV}{P} = Q$$

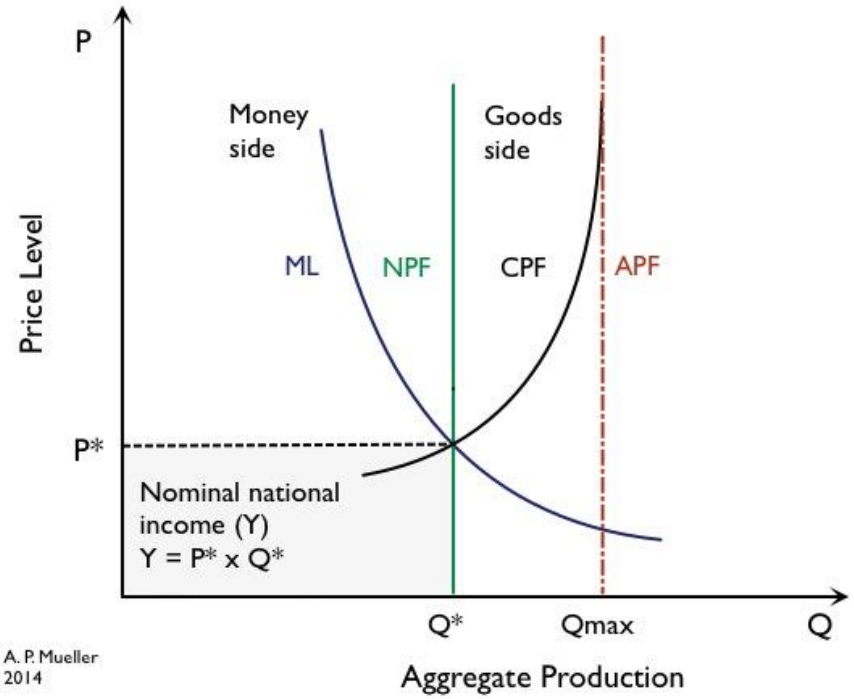
With a fixed money supply and a constant velocity, the relationship between prices (P) and product (Q) forms a hyperbola as

$$f(q) = \frac{1}{p}$$

In its graphical representation (see curve ML in figure 1), the stock of money in circulation represents macroeconomic liquidity (*ML*). In its relation to the price level (*P*)

and quantity of output (*Q*) as the coordinates, the curve reflects the purchasing power of money. With production on the horizontal axis and the price level on the vertical, a fall in prices shows up as a downward move along the curve and implies an increase in the purchasing power of money when the amount of macroeconomic liquidity (*ML*) remains constant. Likewise, a move along the curve to the left upward represents a loss of purchasing power. Shifts of the ML curve denote changes of the amount of macroeconomic liquidity due to changes of the amount of the money stock or its velocity (figure 1).

Figure 1
Basic GSMS model



An increase of the money stock or a rise of its velocity of circulation would shift the ML-curve upward to the right along an imaginary line based on constant differences of distance to the foci. Pure monetary price inflation and deflation would show up as upward and downward shifts of the ML-curve. The model shows that theoretically any one unit of money (*M = 1*) would be sufficient to carry out all economic transactions as the LM-curve moves asymptotically to the axes.

Given that nominal national income (*Y*) is equal to real production (*Q*) multiplied by the price level (*P*), the GSMS model shows nominal income as the rectangle of the

area, which is formed by the price level and production. In order to capture nominal national income, the basic model experiences an extension in the form of

$$M \times V = Q \times P = Y = I + C + \cdots$$

Extending the equation by the components of expenditures for consumption (*C*), investment (*I*) and government (*G*) reveals how the standard Keynesian analysis relates to the money side and the goods side of the economy.

$$Q \times P = Y = C + I + G = P_C \times Q_C + P_I \times Q_I + P_G \times Q_G + P_{EX} \times Q_{EX} - P_{IM} \times Q_{IM}$$

The equation in this form reveals the fundamental uncertainty about whether an increase in expenditures will bring higher production or higher prices. The effects of Keynesian demand side policy depend fully on the actions of the economic agents at the micro level who determine the impact on the goods side relative to the money side.

The goods side/money side model does away with the inconsistency of the ISLM analysis that additional aggregate demand created by deficit spending shifts the IS-curve to the right while leaving the LM-curve constant. Deficit spending says that government spends borrowed money. Such an increase in credit implies a higher money supply. Yet different from the relation between effective demand and production, the ISLM model determines the IS-curve independently from the LM-curve.

In the GSMS model, additional aggregate demand shows up in different shapes of the Y-area (see figure 1 above). A fiscal stimulus, for example, that has no effect on the real economy would move the ML-curve upward to the right – which reflects credit expansion – while the Q-curve would remain constant. A failed fiscal stimulus thus would appear in the graph as an enlargement of the rectangle (*Y=PQ*) with an unchanged base. In contrast, a fully successful fiscal stimulus, whose effect does not lift prices but expands real output, would enlarge horizontally the Y-rectangle. As will be addressed in more detail below, the GSMS model compels its user to differentiate carefully of the degrees how deficit spending (a shift of the LM-curve to the right) affects prices and production.

The GSMS model directs attention to the factors, which compose macroeconomic liquidity. One extension of the equation of exchange is on its right side in order to include nominal national income (*Y*) and its components - the other extension is on the equation's left side in order to include the sources of liquidity. Macroeconomic liquidity (*ML*) in the

money side of the equation is the result of the monetary base (*MB*) multiplied by the financial market or banking multiplier (m_b) and velocity of circulation (*V*).

$$MB \times m_b \times V = ML$$

As this equation shows, the effect of a monetary expansion that begins with an enlargement of the monetary base (*MB*) does not necessarily lead to an increase of macroeconomic liquidity (*ML*). A fall of the financial market multiplier (m_b) as well as a drop of the velocity of circulation (*V*) may abort expansionary monetary policy. Likewise, a rise of these variables would increase macroeconomic liquidity beyond the intentions of policy makers when the banking multiplier and velocity should rise more than expected. These variables themselves depend fundamentally on expectations. Because these expectations will change as consequence of the design and implementation of the macroeconomic policy measures themselves, central banking is in a precarious position as to its effect, which is as uncertain as those of fiscal policy are.

At this stage, the macroeconomic story to tell includes a differentiated account of money, prices and goods that begins with the monetary base and continues to the structure of production (from left to right).

$$BM \times m_b \times V = Q \times P = Y = C + I + G = P_C \times Q_C + P_I \times Q_I + P_G \times Q_G \ldots = ML$$

In terms of actors and decisions, the equation includes the central bank, which decides on the monetary base (*MB*) and the actors in the financial market, who, together with all those who in any way decide about cash holdings, determine the banking multiplier (m_b) and velocity of circulation (*V*). At the right side of the equation, the black box of the aggregates of overall production (*Q*), price level (*P*) and nominal national income (*Y*), opens up in terms of relative prices, such as P_C/P_I or P_I/P_Q, etc. at the level of intermediate aggregation. In detailed form, the extension of the model beyond the intermediate aggregation in terms of the aggregates consumption, investment and government, and the addition of the external sector, would lead to the analysis of the structure of production (Skousen 2007).

Different from the conventional ISLM-AS analysis, the GSMS model makes a clear distinction between the "goods side" and the "money side" of the economy. The GSMS model avoids the confusion surrounding the interest rate of the ISLM model by

using the concept of "macroeconomic liquidity", which is the amount of means of payments in circulation, composed of the factors monetary base (*MB*), banking multiplier (m_b) and velocity of circulation (*V*). These variables have their own statistical representations. In contrast, the ISLM model uses "the" interest rate (*i*) as a crucial variable and is largely indeterminate about whether it is the real or the nominal rate or the short-run or the long-run interest rate or any one of these depending on the specific aspect.

In the GSMS model, macroeconomic liquidity (*ML*) represents the "money supply in circulation" and as such denotes the money supply in use as means of payment to realize aggregate demand. All variables that compose macroeconomic liquidity are interrelated. They will change when expectations change. This instability of macroeconomic relations represents a fundamental disclaimer to the possibility of rational economic policy. Yet – set up as tools for macroeconomic policy-making - the standard ISLM-AS models insinuate capacity of control by the monetary authorities over the money supply and by fiscal policy over the investment schedule.

4 Inclusion of business activity

Firms manage the allocation of capital and labor and in their aggregate determine national income and employment. In its most basic form, business is an entity where entrepreneurs combine labor (*L*), capital (*K*) and knowhow (*A*) in order to have an output (*q*) that sells at a price (*p*) with the intention of earning a profit (*Π*). The relation between sales receipts and costs determines profit and loss.

The macroeconomic perspective requires defining costs in terms of labor and capital with the wage rate (*w*) and the quantity of labor (*L*) along with the interest rate (*i*) and the capital stock (*K*). *Ceteris paribus*, both a higher price (*p*) and more quantity sold (*q*) will increase profits. Likewise, higher profits will result from a lower wage rate (*w*), less use of labor (*L*) as well as from a lower interest rate and less use of capital. Higher productivity shows up as a reduction of costs. The productivity variable (*A)* determines variations of profits at a fixed stock of labor and capital and unchanged wage and interest rates. Taxes that fall on profits (*tΠ*) will reduce gross profits (*Π*). In a fully competitive economy, monopolistic profits exist only temporarily so that in macroeconomic terms economic profits will tend to be zero. Likewise, the compensation of rising labor and capital costs by higher prices and a lower tax rate will also be temporarily. An increase of real income per capita at the macro level requires at the micro level that the output of businesses rises or prices fall at constant quantity of labor.

Different from the DSGE models, the GSMS model is unambiguous to the fact that not aggregate demand but innovation (expansion of the natural production frontier) is the key variable of economic wealth. Temporarily, "lower capital costs" brought about by lower interest rate can boost profits. Yet because the nominal interest rate is composed of the real interest rates plus the expected inflation rate, nominal interest rates can only temporarily kept below its natural level. When the Fisher effect sets in (Mishkin 1991), the nominal interest rate rises to the level, which will compensate for the expected inflation rate.

The following equations provide the micro-foundation of the GSMS model as it links the system to the limits imposed by scarcity.

$$\Pi = (p\ x\ q) - t\Pi - \ (wL + iK) + aA$$
$$\Pi = 0$$
$$(wL + iK) = (p\ x\ q) + aA - t\Pi$$

This type of micro-foundation is fundamentally different from the dynamic stochastic general equilibrium models (DSGE). These models employ a "representative agent" and by analytically transforming the firm's source of profit into a mark-up, DSGE models eliminate dynamic competition and relegate technological progress to external shocks.

Given that firms are able to maintain or even raise their profit rate in the boom, an increase of the wage rate (w) will lift prices (p) the more production approaches the capacity limit to the degree that macroeconomic liquidity is available. One does not need to refer to the Phillips curve in order to recognize the fundamental relation between wage-rate, employment and prices because changes that happen with all of these factors are the result of changes in scarcity and because prices reflect opportunity costs.

The same relation between prices and scarcity holds also for capital. This way, the basic macroeconomic model requires an additional curve to represent cyclical production. The GSMS model thus distinguishes between a "natural" and a "cyclical" production frontier (see figure 1 above). This distinction is fundamental to business activity. The more economic activity approaches the limits of capacity, the more costs will rise and the more it will be necessary to obtain higher prices in order to maintain profitability.

The cyclical production frontier of the model rests on the existence of a regular or normal use of resources, including labor. These regular conditions in the GSMS model

are conceptually close to the concepts of a "natural unemployment rate" and of a "Non-Accelerating Inflation Rate of Unemployment" (NAIRU), as they are calculated by the Organization of Economic Cooperation and Development, for example (OECD 2013). When demand exceeds this level, the degrees of scarcities for capital and labor will rise, whereas when demand falls below this "normal" or "natural" level, relative scarcity would recede temporarily. As prices reflect relative scarcities, demand above the normal level (which comes from more macroeconomics liquidity) will raise the price level. In contrast to the conventional assumption that in the short run capital stock is "fixed", while labor supply is "variable", the GSMS model stresses varying degrees of scarcity.

The GSMS model distinguishes three types of economic growth. Firstly, there is economic growth as an enlargement or improvement of the factors of production – a shift of the natural production frontier (*NPF*) to the right. Then there is economic activity due to a rise in the degree of the use of the existent factors of production – a move along the cyclical production frontier (*CPF).* Finally, there are economic expansions that will not last because current savings are insufficient of providing the funds that were necessary for maintaining the enlarged capital structure. Only the first type represents genuine economic growth.

The shape of the cyclical production frontier (*CPF*) curve in the GSMS model (see figure 1 above) – although similar in appearance to the expectations-enhanced Phillips curve - has different conceptual roots. The traditional Phillips curve comes from empirical investigation. Phelps (1967 and 1968) introduced expectations and the natural rate hypothesis, which makes the curve shift. In the GSMS model, in contrast, the cyclical production frontier (*CPF*) is an analytical scheme. Its economic rationale rests on the law of scarcity. The explanation for the shape of the cyclical production function is analytical, while its empirical content comes from the behavior of labor and capital costs in the various stages of the boom-bust cycle.

The goods side represents the production possibilities frontier. Real production (*Q*) in terms of the natural production possibilities frontier (*NPF*) reflects the scarcity of the factors of production and is independent of prices and money. The position of the natural production frontier (*NPF*) is vertical in the diagram, which is composed of the price level and output as its axes (figure 1 above). Different from an economic expansion, genuine economic growth in this model refers to a rightward shift of the natural production frontier as function of the factors of production only. The NPF-curve denotes the capacity for a normal or natural use of the factors of production. Different from the

cyclical production frontier (*CPF*), which indicates the variation of current production in relation to the price level, the natural production frontier (*NPF*) is independent of the price level and moves according to changes of the factors of production.

5 Summary of the components of the model

The GSMS model is composed of the money side (*MS*), and the goods side (*GS*) with the differentiation between the natural production frontier (*NPF*), the absolute production frontier (*APF*), and the cyclical production frontier (*CPF*). The absolute production frontier marks the utter limit of capacity utilization. In contrast to the natural production frontier, which denotes equilibrium, business activity that moves beyond normal activity and approaches the absolute boundary of capacity utilization (the APF-curve in the model), exemplifies a state of disequilibrium due to its transient character.
With the help of this model, one can analyze a wide range of macroeconomic constellations. The model contains as basic variables macroeconomic liquidity (*ML*), which is composed of the money stock (*M*) and its velocity (*V*).

$$ML = M \times V$$

The other variable is the natural production frontier (*NPF*), which is the level of output as the regular or normal economic activity that is fully or naturally in tune with the productive capacity of the economy, or, in other words, that macroeconomic product, which reflects the production function in terms of the natural contribution of the factors of production.

$$NPF = Qn = f(Ln, Kn, An)$$

The shape of the cyclical production frontier (*CPF*) represents the actual conditions of scarcity, or, in terms of the situation of the firm, current capacity utilization (CU_t).

$$CPF = f\ (CU_t)$$

In as much as the equation of exchange conforms to the Cambridge equation of the demand for money,

$$M^d = kY$$

the GSMS approach makes explicit that variations of the money supply (M^s) will provoke adaptations in the variables of the demand for money:

$$M^s = M^d = kQP$$

The equation in this form shows that the adaptation of monetary demand to variations of supply comes through the nominal cash balance (*kY*), which in turn depends on the price level (*P*), the coefficient of cash holding (*k*) real production (*Q*). The differentiation of aggregate output (*Q*) into a natural (Q_n) and cyclical (Q_c) production frontier helps to do away with the illusion that sustained economic growth could be achieved through monetary expansion. If the cash-holding coefficient does not fully absorb the effect of variations of the money, the remaining impulse will primarily affect cyclical production.

The ML-curve shifts because of the net result of the changes of the factors that determine the curve - such as the monetary base, the banking multiplier and the velocity of circulation. These variables reflect individual, microeconomic action at the level of business and consumers along with the policies of the central bank and government. Money comes into existence through the creation of credit and as much as any of the main economic actors in cooperation with the banking sector contributes to the creation of money, the ML-curve will shift. Thus, a shift of the ML-curve is the result of changes at the micro level and is identical with the use of money for payment purposes and therefore with economic activity. Not the increase of the price level increases, but economic activity when it moves beyond the natural level produces inflation according to the availability of liquidity. It is the increase of relative scarcity, which makes the price level go up as consequence of rising opportunity costs in monetary terms.

The other prime movers in the model are the factors that determine the natural and the cyclical production frontier. The state of the factors of production defines the position of the natural production frontier, while the position of the cyclical production frontier depends on the current use of capacity and changes of productivity. A rise of relative scarcity means higher opportunity costs, which transform into higher prices given the availability of macroeconomic liquidity. The move along the cyclical production frontier transforms into a shift of the curve according to the change of expectations. The role of

the cyclical production frontier in its function as a link to the micro level connects research areas such as those on the causes of productivity (Syverson 2011) with macroeconomics. The natural production frontier, in contrast, represents the economic use of the state of the factors of production.

6 Macroeconomic Typology

In order to analyze macroeconomic constellations and to set up a typology of their structures, the dynamic version of the GSMS model uses the symbol g to signify percentage changes with π standing for changes of the price level.

The dynamic version of the equation of exchange thus reads as:

$$g_M + g_V = g_Q + \pi$$

Given that macroeconomic liquidity (*ML*) is composed of money multiplied by its velocity, the equation becomes

$$\pi = g_{ML} - g_Q$$

In this reduced form, price changes result from the relationship between growth of liquidity and real economic growth (g_{ML} - g_Q). Applying the determinants elaborated above, the equation for price inflation becomes:

$$\pi = (g_{MB} + g_{m_b} + g_v) - (g_{Q_n} + g_{Q_c})$$

In order to obtain price stability with an inflation rate of zero *(π=0)*, the condition is:

$$(g_{MB} + g_{m_b} + g_v) = (g_{Q_n} + g_{Q_c})$$

The rate of unemployment is inverse to economic expansion, i.e. to cyclical growth, while natural economic growth (shift of the NPF-curve to the right) comes with steady employment or an employment rate that remains at its natural level (u_n). Therefore, the current unemployment rate (u_t) is a function of cyclical economic activity (g_{Q_c}), while the natural unemployment rate (u_n) coincides with the natural production frontier (*NPF*). Nominal national income (*Y*) is the product of real production and the price level (*Y = Q*

x P), while g_Y as specified by the model, is the growth rate of nominal income and serves as the indicator (g_Y^*) for nominal income (NGDP) targeting.

The monetarist policy version (Friedman 1968) isolates the link between the money stock and the price level by assuming constancy or trend stability of velocity and production leading to the claim that it is solely the money stock, which determines the price level.

The other major macroeconomic policy goals, inflation targeting (π*) and economic growth targeting (g^*_y) show up in the GS/MS approach in the same set of equations.

$$g_Y^* = g_Q + \pi = g_{Q_n} + g_{Q_C} + \pi = g_{MB} + g_{m_b} + g_V = g_{ML}$$

$$\pi^* = (g_{MB} + g_{m_b} + g_v) - (g_{Q_n} + g_{Q_c)} = g_{ML} - g_Q$$

$$g_Q^* = (g_{Q_n} + g_{Q_c)} = (g_{MB} + g_{m_b} + g_v) - \pi = g_{ML} - \pi$$

What these macroeconomic policy concepts have in common is the focus on macroeconomic liquidity (*ML*). While the focus of nominal national income targeting is solely on macroeconomic liquidity, inflation targeting targets the relation between macroeconomic liquidity and real product. Conventional Keynesian real product targeting deals with macroeconomic liquidity in relation to the price level.

As the equation for nominal income targeting shows, this policy concept is monetarism with the inclusion of velocity, or, in terms of the terminology of the GSMS model, equal to macroeconomic liquidity (*ML*)

$$Y^* = MV = ML$$

Nominal national income targeting wants to compensate fluctuations in the natural and cyclical production frontier through monetary measures. The aim is to expand nominal gross domestic product (gdp) at a specified rate based on the long-term composition of the growth rate of nominal gdp in its composition of real output growth (g_Q) and the inflation rate (π). Inflation targeting (π*), in contrast, uses the monetary variables only in order to compensate for expansion and contraction of the goods side. Targeting real economic growth (g_Q^*), however, represents Keynesian-type monetary and fiscal policy with its claim that an increase of aggregate demand would lift output.

$$Q^* = \frac{MV}{P}$$

Represented this way, it becomes clear that the demand-management approach fails to take into account that deficit spending (increase of MV) does not necessarily raise output (*Q*), because it may just as well increase the price level (*P*) with zero effect on output. Opening up the black box of spending only a little more, reveals the pitfalls of demand-side stimulus policies.

$$Q^* = Q_C + Q_I + Q_G \ldots = \frac{MV}{P_C + P_I + P_G} \ldots$$

Stimulus policies are not only uncertain as to whether they mainly affect production (*Q*) or pries (*P*), but it is also ex ante uncertain which sub aggregates will receive the impact.

The GSMS model provides tools to identify macroeconomic configurations. The macroeconomic variables that make up the model show up in the set of the basic equations of the GSMS model and manifest themselves as shifts of the natural and cyclical productions functions along with the curve for macroeconomic liquidity. The equations and their graphical representation serve as diagnostic instruments to identify those sets of macroeconomic variables, which determine particular macroeconomic configurations (for a detailed exposition of macroeconomic configurations see the appendix at Mueller 2014).

Analytically, the set of equations reveals the mechanism of the transformation of monetary price inflation into monetary hyperinflation when monetary expansion not only affects the price level yet begins to erode the economy's productive capacity (negative impact of the increase of macroeconomic liquidity on the cyclical and natural production frontier). Specific historical constellations, such as the Great Depression, for example would appear as an explicit set of macroeconomic variables as defined in the GSMS model. The current "Great Recession" with actual economic growth below potential in spite of expansive monetary policy (Salerno 2012), would show up as a strong expansion of the monetary base, which does not transform into its equivalent of higher liquidity because of a low banking multiplier and falling velocity. Consequently, the effect of monetary policy on output and prices remains flat.

The GSMS model serves to counter claims such as, for example, that deficit financing of infrastructure projects were justified as a growth strategy because more government spending would strengthen aggregate demand and thus contribute to economic growth (ISLM version) or that investment in infrastructure is the way to expand the supply side (AS/AD version). In contrast to these assertions, the GSMS model offers a differentiated analysis and comes to a different conclusion. It shows that whatever spending, whether for consumption or investment, when it comes with credit expansion, moves the ML-curve away from the origin and ceteris paribus implies a higher inflation rate. The GSMS model points to the distinction whether deficit financed spending does improve the factors of production or just fabricates a temporary economic expansion. When the impact of investment in infrastructure is mainly higher demand, the effect will be inflationary and this is indeed what many countries, especially in the developing world, frequently have experienced instead of development (Easterly 2002).

The GSMS model helps to identify specific macroeconomic configurations and to orient their detailed analyses. This way, the model provides a basic macroeconomic structure that shows the connections between the different parts of the macro-economy. As such, the GS/MS model serves to guide teaching and research as well as to offer a framework for the discussion of economic policy concepts and their interrelations, as it is the case, for example, with business cycle research.

7 The GSMS-SS model

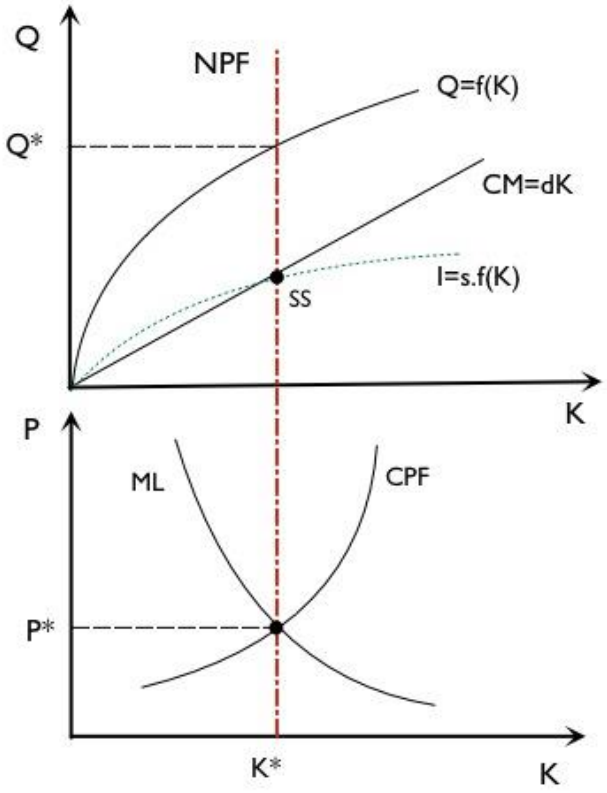
The GSMS-SS model employs a production function under the condition of constant labor and absence of technological progress. In terms of the equation of exchange as elaborated above, velocity in the GSMS-SS model represents only capital-related transactions (V_C). Likewise, macroeconomic liquidity (*ML*) and the natural and cyclical production frontier related to the capital stock. In the upper part of the GMS-SS model, output (Q) determines income (*Y*) and savings (*S*) in line with the savings rate (*s*) which is equal to investment *(I).* The size of savings and investment determine the point of steady state (*SS*) as that level of capital accumulation (*K**) where sufficient savings are generated to maintain the capital structure.

$$CM = dK = I = S = sY$$

The GSMS-SS model combines the goods side/money side model and the neoclassical Solow and Swan (SS) growth model. As a result, this synthesis bridges the gap between

the short and the long run in macroeconomics. The upper part of the GSMS-SS model shows the Solow and Swan growth model, while the lower part shows the GSMS model with the modification that the abscissa now represents capital (*K*) identical to the upper part in the growth model (see figure 2).

Figure 2
GSMS-SS model



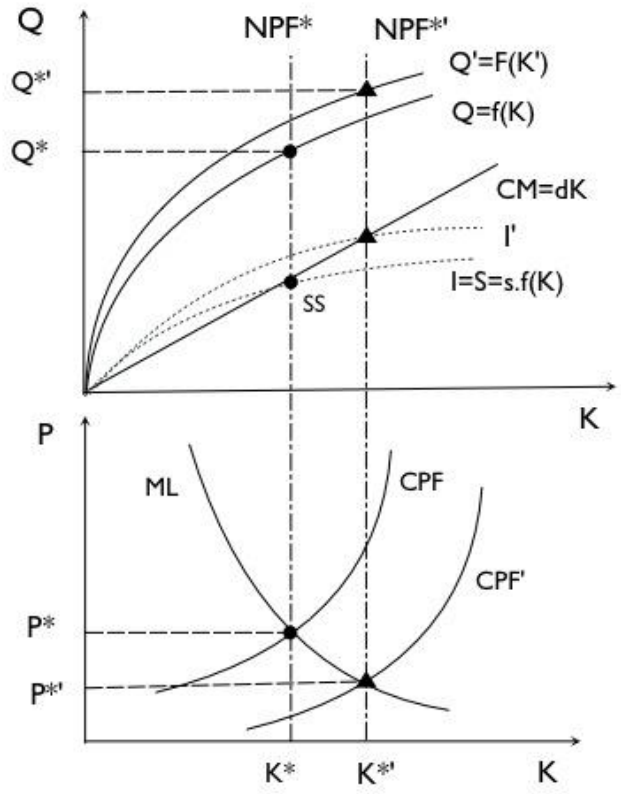
The natural production frontier (*NPF*) of the GSMS model features as steady state in terms of capital accumulation. At the point of steady state (*SS*), the economy has reached that level of output where current capital accumulation stands at a level that is compatible with savings so that investment is large enough to assure the maintenance of the capital structure that is in place. Higher output that comes with an enlargement of the capital base would move the economy beyond K* into a situation where the requirement of capital maintenance exceeds savings. This kind of economic growth will abort and revert to the steady state.

When capital accumulation stands below the level of steady state marked by K*, there is an excess of savings over the requirement of capital maintenance. With capital

accumulation, the economy will attain growth and move towards the steady state equilibrium. Once the economy has reached its steady state, further economic growth comes through technological progress by which the production function curve shifts upward and with it lifts the savings curve (figure 3).

Figure 3

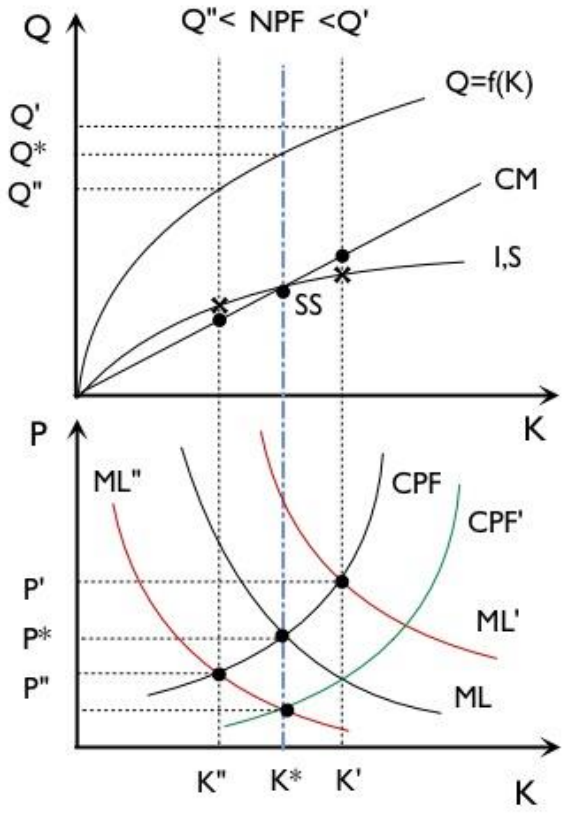
The GSMS-SS model – economic growth equilibrium



The lower part of the graph (figure 3) shows a shift of the natural production frontier (*NPF*) towards the higher capital level and more output, while the cyclical production frontier (*CPF*) shifts downwards as the result of productivity gains that come with technological progress. As a consequence, *ceteris paribus*, with both the money stock (*M*) and velocity (*V*) unchanged, the price level (*P*) will fall. The natural path of economic growth comes with a fall of the price level. In as much as technological progress happens incrementally in moderate steps and economic agents have time to adapt, this kind of deflation will not become disruptive. This kind of beneficial deflation is quite different from malicious deflation that results from an abrupt collapse of macroeconomic liquidity – typically as the reversal of an unsustainable boom.

Different from the natural growth process of figure 3, where technological change provides the source of economic growth and the economy expands with a falling price level, the boom-bust cycle is the consequence of a monetary expansion (figure 4).

Figure 4
Credit-induced boom-bust cycle



The boom-bust cycle shows up in the GSMS-SS model as a deviation from steady state brought about by the expansion of macroeconomic liquidity that moves the economy beyond its equilibrium. The overextension of the productive capacity of the economy provokes increasing scarcity and the price level will rise (*P'*) in line with the increase of macroeconomic liquidity (*ML'*). When nominal interest rates will incorporate the higher price level and rise in tandem with the wage rates, firms will face a profit squeeze and must reduce output. The economy moves back towards its steady state and beyond the earlier steady state to K" as the recession reveals the bad investment of the unsustainable expansion period. Debt overhang will provoke a contraction of liquidity and the economy enters into a phase of deflationary depression (*K"/P"*). A natural recovery can begin when

the capital stock has shrunk far enough so that the costs of capital maintenance are below savings and necessary investment at K''/Q''.

While in some cases such a policy may succeed because the monetary expansion coincides with technological progress, such an expansion will lead to a bust when the monetary expansion exceeds the pace of technological progress. Such unsustainable expansions are highly deceiving because for some time, as long as technological progress holds up to monetary expansion, the price level will remain steady and conform to the inflation targeting of the central bank. Due to technological progress, the monetary expansion need not become manifest as a higher price level. While the stable price level deceives monetary policy, when in fact monetary expansions continues beyond technological progress, investors will pursue wrong investments that prove unsustainable once the boom reverts into a bust. By not letting benign deflation happen as natural economic growth based on productivity gains at the inception of the expansion, central banks face malicious deflation in the bust phase of the credit-driven business cycle.

8 Conclusion

The GSMS model avoids the inconsistencies of the ISLM and AS/AD analyses. The GSMS approach applies a clear-cut distinction between the "goods side" and the "money side" and differentiates between the cyclical and natural production frontier instead of the "short" and the "long" run as it is done in the AS/AD analysis. The GSMS model avoids the ambiguities of the ISLM analysis concerning "the" interest rate, which in the Keynesian analysis is the same for long-term investment decision and the short-term decision about the demand for money. The GSMS model relegates economic growth to the natural production frontier and thus avoids the ambiguity of the models of effective demand where the assumption of a constancy of the price level makes inflationary expansion equal to an expansion of real output and economic growth. For the GSMS model, there is no need in macroeconomics for an optimizing "representative agent" when Say's law is reinstated. The GSMS approach is not a policy tool, but an explanatory model. Therefore, this model is immune to the Lucas critique because the ineffectiveness of macroeconomic policies of achieving its goals lies at the heart of the GSMS model.

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